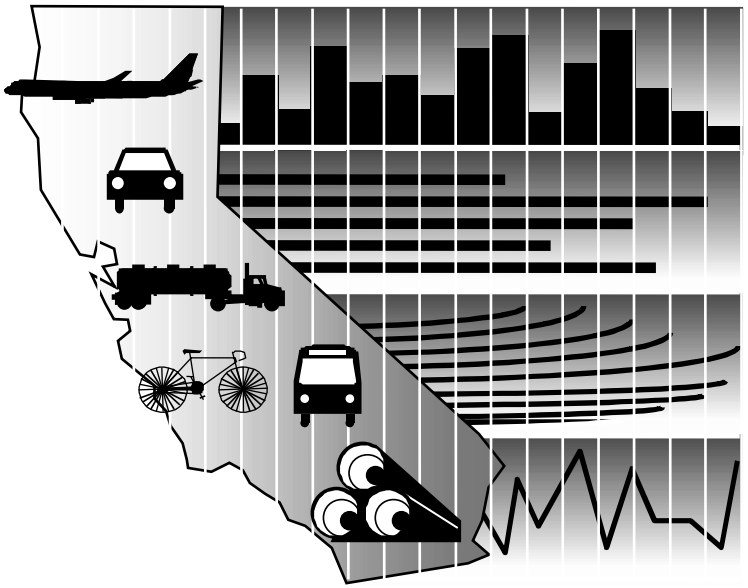
California Department of Transportation
Transportation System Information Program

Transportation System Performance Measures



Booz·Allen & Hamilton Inc.
February 24, 2000

Agenda…

TODAY, WE WILL…

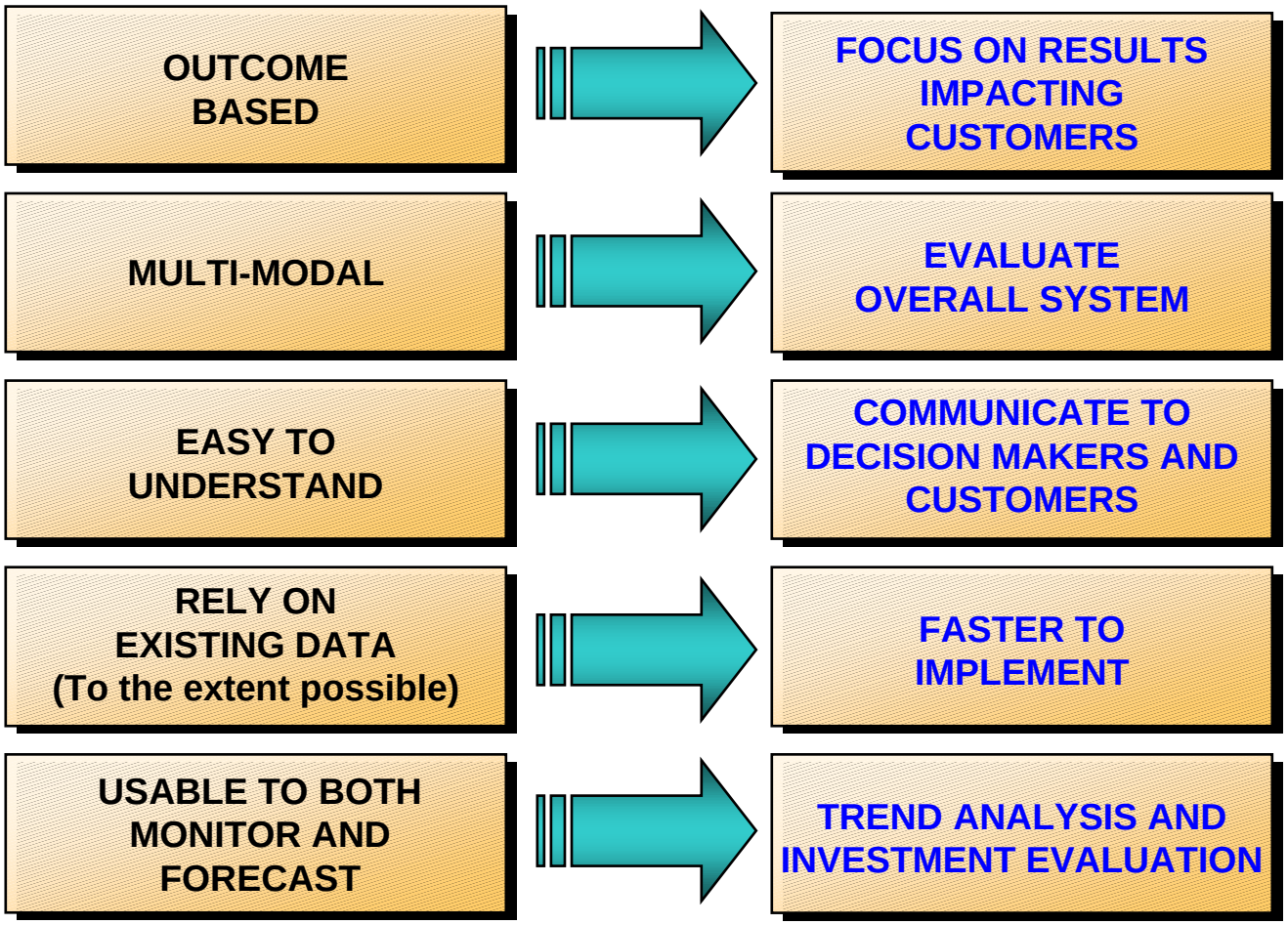
- Succinctly review previously discussed work efforts in the performance measure initiative
- Present our progress in researching the second set of outcomes for the Performance Measurement Initiative: sustainability and cost effectiveness
- Provide an update on findings related to the inter-regional State of the System Report
- Explore the applicability of outcomes and indicators to SHOPP

I. PREVIOUS WORK EFFORTS

SYSTEM OUTCOMES AND ASSOCIATED CANDIDATE INDICATORS

DESIRED OUTCOMES	DEFINITION	CANDIDATE MEASURES/ INDICATORS
Mobility/Accessibility	Reaching desired destinations with relative ease within a reasonable time, at a reasonable cost with reasonable choices.	• Travel Time • Delay • Access to Desired Locations • Access to the System
Reliability	Providing reasonable and dependable levels of service by mode.	• Variability of Travel Time
Cost-Effectiveness	Maximizing the current and future benefits from public and private transportation investments.	• Benefit / Cost Ratio • Outcome Benefit per unit of Cost
Sustainability	Preserving the transportation system while meeting the needs of the present without compromising the ability of future generations to meet their own needs.	• Household Transportation Costs
Environmental Quality	Helping to maintain and enhance the quality of the natural and human environment.	• National and State Standards
Safety and Security	Minimizing the risk of death, injury, or property loss.	• Accident and Crime Rate
Equity	Distributing benefits and burdens fairly.	• Benefits per Income Group
Customer Satisfaction	Providing transportation choices that are safe, convenient, affordable, comfortable, and that meet customer needs.	• Customer Survey
Economic Well-Being	Contributing to California's economic growth.	• Final Demand (Value of Transportation to the Economy)

PHASE II FOCUSED ON THE PROOF-OF-CONCEPT TESTING OF CANDIDATE INDICATORS AND WAS BASED ON FIVE KEY PRINCIPLES



SINCE THEN, WE HAVE FOCUSED ON SEVERAL EFFORTS

- Building consensus within Caltrans
  - Director and Executive Management
  - District Directors and Planning Staff
  - Program staff at Headquarters

- Developing training materials
  - Mobility
  - Reliability
  - Safety

- Further researching outcomes on a proof-of-concept basis
  - Sustainablity
  - Cost effectiveness
  - Economic well-being

- Developing the first Inter-Regional State of the System Report

WE ARE CURRENTLY DEVELOPING A "HOW TO" IMPLEMENT PERFORMANCE MEASURES MANUAL FOR CALTRANS STAFF

- The manual will provide a step-by-step guide on how to develop indicators for each outcome

- Each section of the manual will thoroughly describe the data sources, data limitations (if any), and especially the procedures for deriving each indicator that has completed the proof-of-testing process

- The first edition of the manual will mirror the State of the System report and include sections on mobility, reliability and safety

II. FURTHER TESTING OF OUTCOMES

Definition of Outcomes and Candidate Indicators for Sustainability

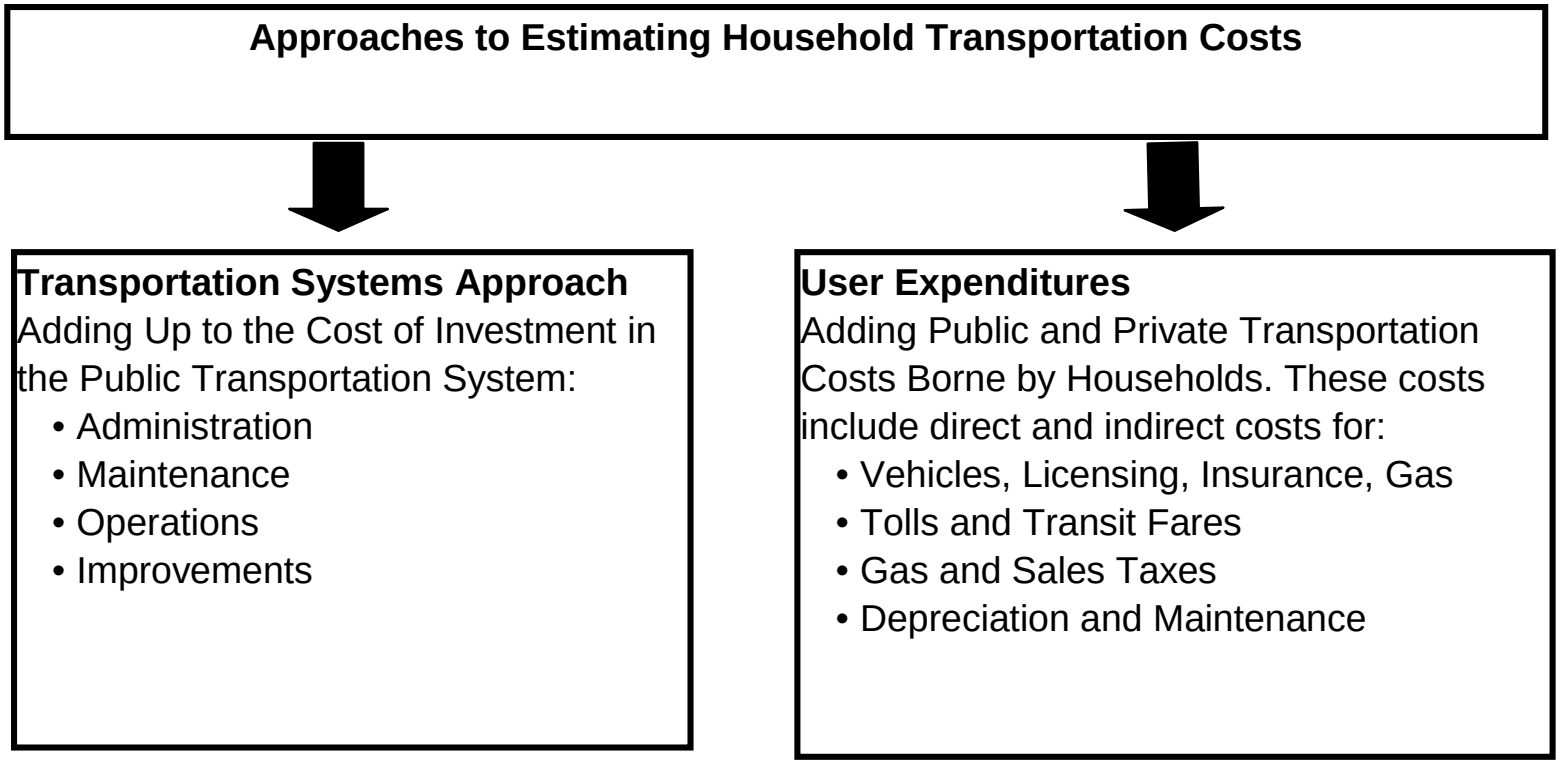
TRANSPORTATION ADVISORY STEERING COMMITTEE DEFINITION

Preserving the transportation system while meeting the needs of the present without compromising the ability of future generations to meet their own needs

CANDIDATE INDICATOR FOR SUSTAINABILITY

The average percentage of household resources dedicated to transportation over a period of time

WE BELIEVE THERE ARE TWO APPROACHES TO ESTIMATING CURRENT AND FUTURE HOUSEHOLD TRANSPORTATION COSTS



EVEN THOUGH NEITHER APPROACH IS PERFECT, IT APPEARS THAT THE TRANSPORTATION SYSTEMS APPROACH IS BETTER SUITED FOR MONITORING AND FORECASTING

- Management systems exist that can evaluate current system conditions and the cost of maintaining and/or improving these conditions:
  - pavement management systems
  - bridge management systems
  - transit management systems

- Forecasting costs and conditions are significantly more defensible than forecasting fuel costs, automobile prices, transit fares and tolls

- This approach also allows decision makers focus on controllable strategies as opposed to external factors

MONITORING SUSTAINABILITY WOULD THEN ENCOMPASS COLLECTING AGENCY BUDGETS AND PRESENTING THE RESULTS AS A PERCENT OF HOUSEHOLD INCOME

- Most agency budgets are available (e.g., Caltrans, regional agencies, transit operators). However, actual expenditures are more difficult to identify and collect

- Collecting agency transportation costs alone may not adequately reflect sustainability:
  - infrastructure conditions may have improved or worsened
  - operations costs may have increased or diminished
  - federal/state/regional/local funding may have increased or diminished

- Somehow we must integrate "preservation" into the candidate indicator for sustainability. However, infrastructure and capital equipment condition is not currently reported consistently among modes

- If we want to achieve such integration, we must address two challenges:
  - how do we communicate "preservation" in a modally blind manner?
  - how do we set a base for comparison and trend analysis

WE ARE ALSO LOOKING AT ALTERNATIVE INDICATORS THAT MAY BETTER SUIT THE ORIGINAL INTENT OF THE POLICY ADVISORY COMMITTEE

OUTCOME: COST EFFECTIVENESS	
Definition	The benefits realized from transportation compared to the cost of providing its services.
Discussion	Cost effectiveness builds on the benefits measured under all outcomes and presents these benefits in relationship to the costs of transportation service delivery.
Candidate Measures	Cost-effectiveness ratios, such as: • Cost effectiveness of forecasted mobility/accessibility, reliability, safety and environmental quality • Aggregate benefit-cost ratio.

CANDIDATE MEASURES: COST-EFFECTIVENESS RATIOS	
Definition	Individual outcome benefits and total dollar benefits are divided by costs.
Discussion	These benefit-cost ratios will reflect benefit-cost ratios by type of benefit. A given project or program will therefore have multiple measures. Regions and stakeholder agencies can then place different values on benefits without having to translate these benefits into financial terms.

TRANSPORTATION AGENCIES ARE INCREASINGLY INCLUDING COST EFFECTIVENESS, OR BENEFIT-COST RATIOS, AS PART OF THEIR INVESTMENT DECISION-MAKING PROCESS

- Caltrans Transportation Planning considers benefit-cost ratios as part of the Inter-Regional State Transportation Improvement Program (ITIP) evaluation. Transportation Planning has developed a computerized benefit-cost model (Cal-B/C) for evaluating highway and rail projects included in the ITIP

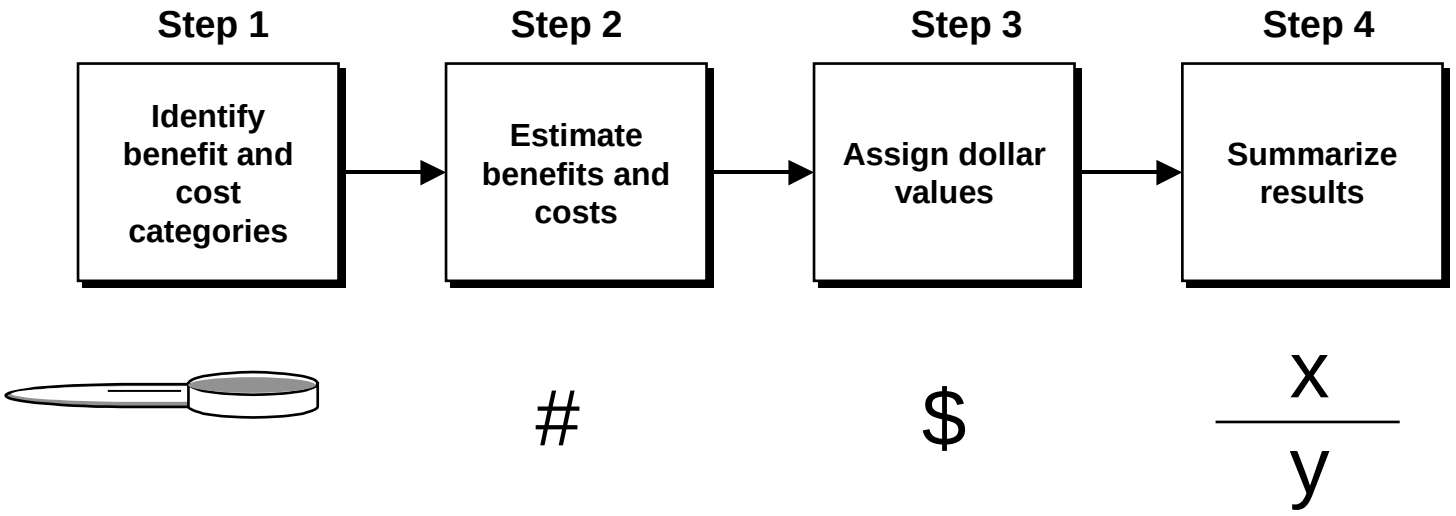
- The Ten-Year State Highway System Rehabilitation Plan provides benefit-cost ratios for typical projects for each element of the State Highway Operation and Protection Program (SHOPP). The new Advanced Pavement Management System will incorporate benefit-cost evaluation

- Benefit-cost ratios were considered as part of an evaluation of the Caltrans Traffic Operations Strategies (TOPS) and are included in an upcoming report to the State Legislature on TOPS

- BART recently conducted an analysis that concluded that investing in a major rehabilitation project of some of its rail cars could save the agency future costs needed to replace its fleet

- Both the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) have developed computerized benefit-cost models. Recent benefit-cost research has focused on evaluating emerging technologies, such as intelligent transportation systems (ITS)

BENEFIT-COST FRAMEWORK



GIVEN THESE TRENDS, BENEFIT COST RATIOS SEEMED APPROPRIATE AS COST-EFFECTIVENESS INDICATORS

- To estimate cost effectiveness using benefit/cost evaluation, a dollar value is typically assigned to all program/project impacts that can be quantified. The analysis often includes externalities, such as air pollution

- The results of the benefit-cost evaluation can be summarized as benefit-cost ratios or in terms of another statistic. Typical summary statistics include:

  – Benefit-cost ratios
  – Internal rates of return
  – Net present value

- Organizations frequently examine multiple measures, since each measure has a different interpretation. For example, a project that produces a large benefit-cost ratio may have a small net present value

- Putting a dollar value on some transportation benefits and costs can be difficult and controversial (e.g., mobility, environmental benefits)

- An alternative way to measure cost effectiveness is calculate cost-effectiveness ratios. Rather than assign a dollar value to each benefit or cost, benefit-cost ratios are calculated by type of benefit. This allows agencies to place different values on benefits without having to translate these benefits into financial terms

OUTCOMES INCLUDED IN BENEFIT-COST EVALUATION

Outcome	Definition	Included?
Mobility/Accessibility	*Reaching desired destinations with relative ease within a reasonable time, at a reasonable cost with reasonable choices*	Yes
Reliability	*Providing reasonable and dependable levels of service by mode*	Occasionally
Customer Satisfaction	*Providing transportation choices that are safe, convenient, affordable, comfortable, and meet customers' needs*	Indirectly
Economic Well-Being	*Contributing to California's economic growth*	No
Sustainability	*Preserving the transportation system while meeting the needs of the present without compromising the ability of future generations to meet their own needs*	Partially
Environmental Quality	*Helping to maintain and enhance the quality of the natural and human environment*	Yes
Safety and Security	*Minimizing the risk of death, injury, or property loss*	Yes
Equity	*Fair distribution of benefits and burdens*	No

COST EFFECTIVENESS AGGREGATES SEVERAL OTHER OUTCOMES

- Cost effectiveness builds on the benefits measured under other outcomes and adds the cost component of delivering transportation services

- The benefits included in cost effectiveness evaluations varies, but typically includes all benefits that can be quantified:

  – Travel times
  – Operating costs
  – Accident/safety costs
  – Environmental costs

- Many of these benefits are included in other outcomes. For instance, travel times are considered as part of the mobility outcome, while accident/safety costs are included in the safety outcome. Typically, these are the largest benefits in benefit-cost evaluations

- Some outcomes, such as equity and economic well-being, are not usually included in benefit-cost calculations

- Cost effectiveness includes the user cost portion of sustainability, but not the condition assessment. Cost effectiveness indirectly considers customer satisfaction

AGENCIES SHOULD BE AWARE OF POTENTIAL OVERLAPS WHEN CHOOSING APPROPRIATE PERFORMANCE OUTCOMES

COST EFFECTIVENESS IS AN OUTCOME MORE SUITED FOR FORECASTING THAN FOR MONITORING

- Most benefit-cost models focus on forecasting and evaluating project/program impacts rather than monitoring progress in obtaining goals

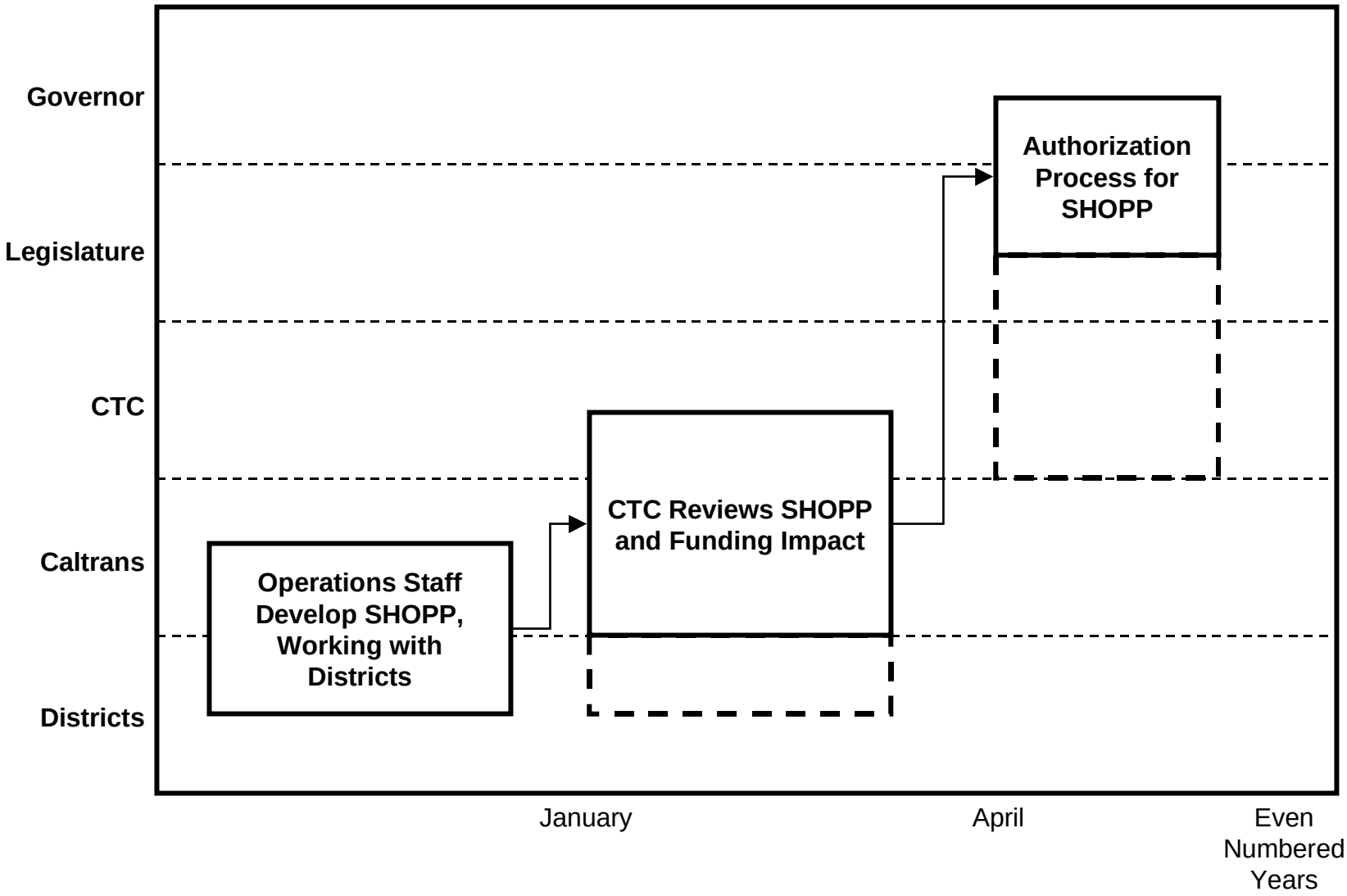
- One reason for this focus is that the full project benefits are typically realized after construction ends. For example, consider a project that requires multiple years to construct. If the project does not open and begin to produce benefits until the second year, monitoring the progress after the first year will show that the project produced no benefits for the funds expended that year. However, this does not mean that the project is not/will not achieve its goals

- Another reason that benefit-cost models focus on forecasting is that a life-cycle evaluation must consider the costs of operating and maintaining a project. Most of the larger capital costs occur up-front, while the smaller operating costs occur later. This does not mean that projects are more cost effective in later years, only that costs occur at different times

- Monitoring cost effectiveness is also difficult because future year forecasts include costs in addition to benefits. Costs may be higher than expected due to problems in forecasting rather than actual cost increases

III. APPLICABILITY OF INDICATORS TO SHOPP

SHOPP APPROVAL PROCESS



THE STATE HIGHWAY OPERATION AND PROTECTION PROGRAM (SHOPP) IS DEDICATED TO PRESERVE AND PROTECT THE STATE HIGHWAY SYSTEM

- The SHOPP is submitted every even-numbered year to the California Transportation Commission (CTC) for approval regarding:
  - Program review
  - Level of funding required
  - Impact of proposed expenditures on State Transportation Improvement Program (STIP)
- The CTC works with Caltrans to refine the SHOPP, approve the program and submit it to the Legislature and Governor by April of the same years
- Since 1998, Caltrans has produced a Ten-Year State Highway System Rehabilitation Plan for all state highways and bridges owned by the State. This plan is updated every two years. A draft of the 2000 Plan was recently released
- The ten-year rehabilitation plan is developed after the Fund Estimate is adopted by the CTC and cannot provide input to the Fund Estimate. To remedy this situation, Caltrans proposes in the latest draft to update the Ten-Year Plan on an annual basis

SHOPP KEY GOALS

Traffic Safety

- Reduce the severity and number of accidents (I.e., continue trends of decreasing fatal-plus injury accident rate

Roadway Rehabilitation

- Reduce deteriorated pavement needs
- Switch from “worst-first” to “preventive treatment” management strategy
- Use longer life pavement rehabilitation for heavy traveled areas
- Apply preventive treatment management strategies for bridges

Roadside Rehabilitation

- Keep mitigation promises
- Reduce worker exposure to traffic
- Comply with health and safety codes & ADA

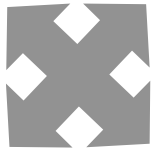
Operations

- Better utilize existing highway facilities
- Protect the state highway system from over-weight and illegal loads
- Implement land and building facilities consolidation studies
- Bring facilities up to current standards through seismic, safety & ADA

SHOPP CONTAINS FOUR MAIN PROGRAMS, WHICH ENCOMPASS A VARIETY OF PROJECTS

TRAFFIC SAFETY
Safety Improvements
Urban Freeway Median Barriers

ROADWAY REHABILITATION
Bridge Rehabilitation and Scour
Roadway Rehabilitation
Long-Life Pavement
Major Damage Restoration
Roadway Protective Betterments



ROADSIDE REHABILITATION
Highway Planting
Urban Freeway Maintenance Access
Roadside Enhancement
Safety Roadside Rest Areas

OPERATIONS
Operational Improvements
Transportation Management
Weigh Stations
Hazardous Waste Cleanup
Land and Buildings

IN ADDITION, THE SHOPP MANAGES THE MINOR PROGRAM AND TRANSPORTATION ENHANCEMENT ACTIVITIES (TEA), CALTRANS SHARE FROM TEA-21

QUANTIFIABLE DATA ARE AVAILABLE OR EASILY GATHERED TO MONITOR AND FORECAST SEVERAL PERFORMANCE OUTCOMES FOR SHOPP PROJECTS

OUTCOME	ROADWAY REHABILITATION	OPERATIONS	TRAFFIC SAFETY	ROADSIDE REHABILITATION
Safety	✓	✓	✓	
Mobility / Accessibility	✓	✓	✓	
Reliability	✓	✓	✓	
Cost Effectiveness	✓	✓	✓	✓
Customer Satisfaction	✓	✓		✓
Sustainability	✓			

SHOPP PROJECTS MAY AFFECT OTHER OUTCOMES, BUT THE IMPACT IS LIKELY TO BE SMALLER

SUSTAINABILITY, COST EFFECTIVENESS, AND CUSTOMER SATISFACTION APPEAR TO BE THE MOST APPLICABLE OUTCOMES FOR ROADWAY REHABILITATION

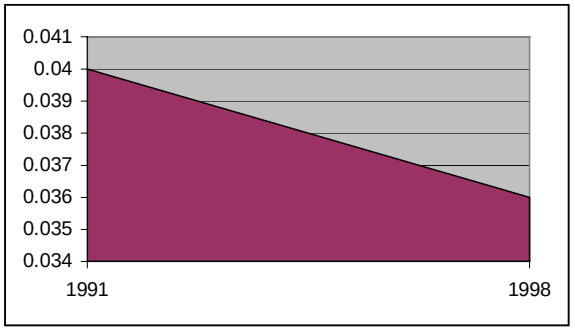
OUTCOME	INDICATOR	APPLICABILITY AREA	DISCUSSION
Sustainability	To be determined	Support optimal sustainable maintenance	Document shift from "worst first" to "preventive treatment" maintenance
Cost Effectiveness	Benefit-cost ratio	Economic benefit required for justification of recommended expenditures	Benefit-cost ratio varies by sub-category • Pavement Rehab.: 4:1 • Bridge Rehab.: 3:1 • Longer Life Pavement: 5:1
Customer Satisfaction	Customer Satisfaction Index	Over 50 percent of roadway rehabilitation funds address pavement deficiencies	According to public surveys both in California and other states, smooth-riding pavement ranks first with motorists

ROADWAY REHABILITATION MAY ALSO AFFECT MOBILITY AND RELIABILITY, BUT THESE WOULD BE DIFFICULT TO MEASURE

THE GREATEST NUMBER OF SYSTEM OUTCOMES – SAFETY, MOBILITY, RELIABILITY, AND COST EFFECTIVENESS – APPLY TO OPERATIONS PROJECTS

OUTCOME	INDICATOR	APPLICABILITY AREA	DISCUSSION
Safety	1. Number of Accidents (fatalities and injuries) 2. Fatality rates (fatalities per VMT) 3. Injury rates (injuries per VMT)	Support goals of: Reducing the number of fatal-plus-injury accidents per million vehicle miles, Protecting from over-weight and illegal loads	Transportation Management Systems (Transportation Management Center or TMC) improvements, intelligent transportation system (ITS) components, and increased enforcement can help reduce fatalities
Mobility	Lost Time	Support goal of better utilizing existing highway facilities	Caltrans currently uses Delay Index combined with a modified Safety Index to determine benefits
Reliability	Variability of Travel Time	Support goal of better utilizing existing highway facilities	Documentation of reduced delay to Commercial Vehicles, due to weigh-in-motion and automatic vehicle identification technology for freight travel
Cost Effectiveness	Benefit-cost ratio	Economic benefit required for justification of recommended expenditures	Benefit-cost ratio is 3:1 (10-Year economic benefits for Traffic Safety investment estimated at $3.4 billion)

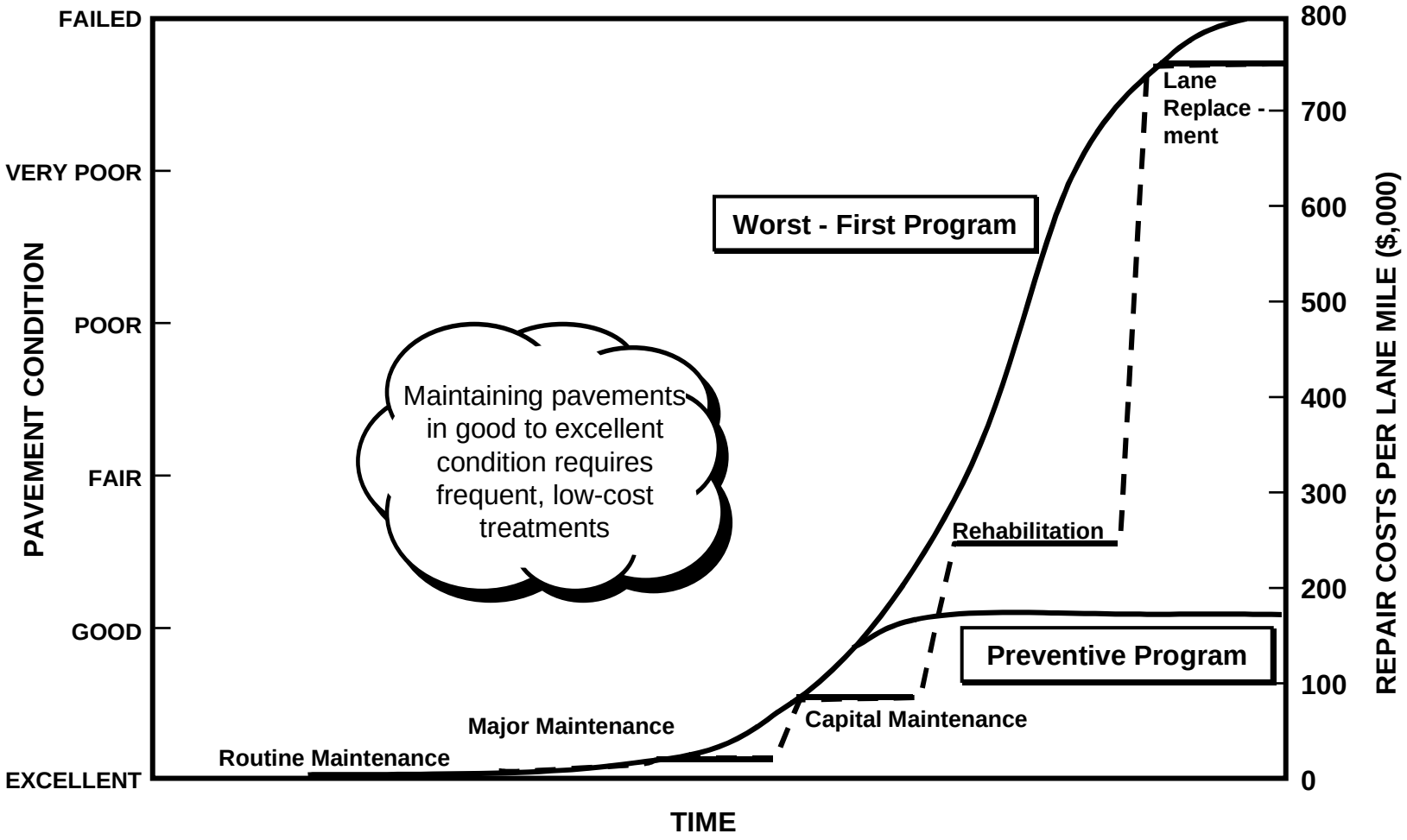
SAFETY AND COST EFFECTIVENESS OUTCOMES HAVE CLEAR APPLICABILITY TO PROJECTS FALLING IN THE TRAFFIC SAFETY CATEGORY

OUTCOME	INDICATOR	APPLICABILITY AREA	DISCUSSION
Safety	1. Number of Accidents (fatalities and injuries) 2. Fatality rates (fatalities per VMT) 3. Injury rates (injuries per VMT)	Support stated goal of reducing the number of fatal-plus-injury accidents per million vehicle miles	 Fatal-plus-injury per million VMT has declined by 0.004 since 1991
Cost Effectiveness	Benefit-cost ratio	Economic benefit required for justification of recommended expenditures	Benefit-cost ratio is 10:1 (10-Year economic benefits for Traffic Safety investment estimated at $6.6 billion)

THE MOST APPLICABLE OUTCOMES FOR THE ROADSIDE REHABILITATION INCLUDE COST EFFECTIVENESS AND CUSTOMER SATISFACTION

OUTCOME	INDICATOR	APPLICABILITY AREA	DISCUSSION
Cost Effectiveness	Benefit-cost ratio	Economic benefit required to justify recommended expenditures	Benefit-cost ratio is 2:1 (10-Year economic benefits for Traffic Safety investment estimated at $0.8 billion)
Customer Satisfaction	Customer Satisfaction Index	The majority of projects in Roadside Rehabilitation address roadside beautification, and overall trip quality	Plantings, barrier vegetation and rest stops are valued by the traveling public

PAVEMENT CONDITION VERSUS COSTS OF REPAIR



Source: Ten-Year Highway System Rehabilitation Plan

SINCE OUR LAST MEETING, WE MET WITH CALTRANS STAFF TO DETERMINE AVAILABLE DATA SOURCES AND DECISION TOOLS FOR ROADWAY REHABILITATION PROJECTS

- Roadway rehabilitation projects represent nearly two-thirds of total expenditures in the SHOPP. In the 2000 Ten-Year Plan, roadway rehabilitation projects account for $7.2 billion out of $10.6 billion in SHOPP and Minor Program funding

- We focused on pavement and bridge repair and placement projects. These projects comprise more than 90 percent of total roadway rehabilitation project funding or just over three-fifths of total funding in the 2000 SHOPP

- Information was collected on:

  – Pavement Condition Survey
  – Current and Advanced Pavement Management System
  – Annual State of the Pavement Report
  – Bridge SMART System

IV. STATE OF THE SYSTEM REPORT

BOOZ·ALLEN IS CURRENTLY DEVELOPING THE INTER-REGIONAL STATE OF THE SYSTEM REPORT

- The *Inter-Regional State of the System Report* is the first step toward a comprehensive state-of-the system reporting system. The report will give state and local decision makers an easy to understand assessment of how well the state's transportation systems are performing

- The study team has already developed a comprehensive inventory of inter-regional transit services provided by public and private entities covering both inter-city rail and bus modes

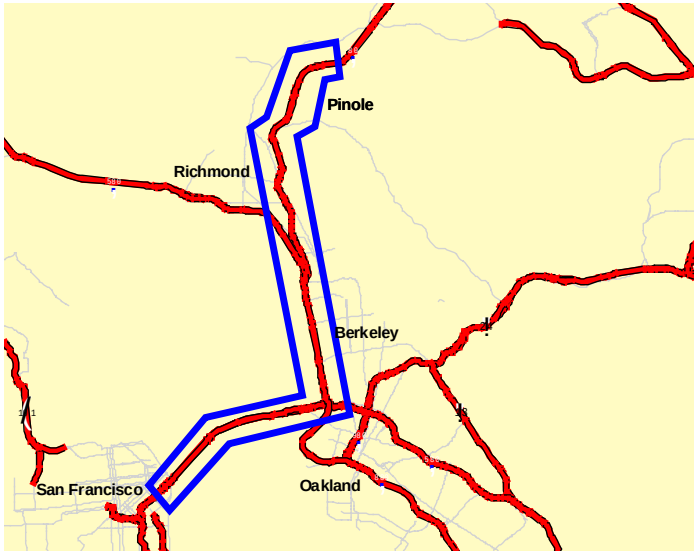
- Significant data has been collected to analyze the mobility and accessibility of these transit services. Preliminary results of the analysis will be discussed in this presentation

- Highways mobility and reliability will be addressed for urban areas. The study team is collecting loop detector data from several Caltrans districts

HIGHWAY MOBILITY AND RELIABILITY EXAMPLE

San Francisco

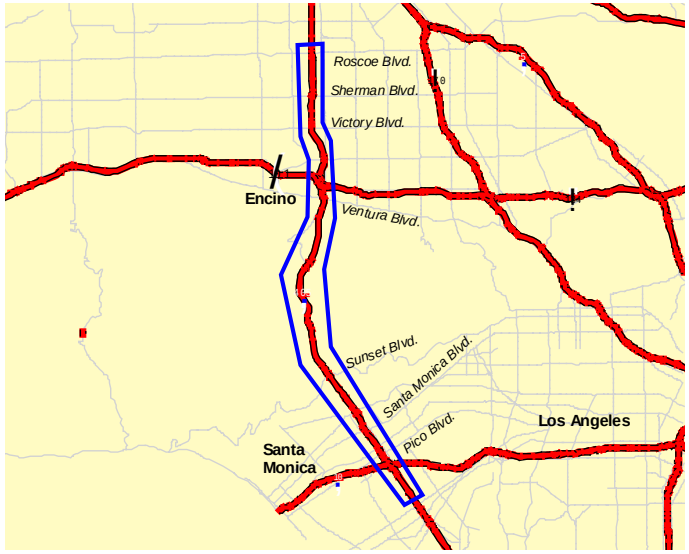
Westbound
Pinole (Appian Way) to San Francisco (4th Street)
Distance = 7.60 Miles



Time of Day	MOBILITY: Average Travel Time (Minutes)	MOBILITY: Average Delay (Minutes)	RELIABILITY: Standard Deviation (Minutes)	RELIABILITY: Percent Variation
6:00-6:30 AM	12.4	5.3	1.1	9%
6:30-7:00 AM	13.3	6.3	1.9	14%
7:00-7:30 AM	19.7	12.7	1.6	8%
7:30-8:00 AM	22.0	14.9	2.6	12%
8:00-8:30 AM	22.3	15.3	3.0	14%
8:30-9:00 AM	18.9	11.8	1.8	10%

Los Angeles

Southbound
Roscoe Blvd. To I-10
Distance = 14.1 Miles



Time of Day	MOBILITY: Average Travel Time (Minutes)	MOBILITY: Average Delay (Minutes)	RELIABILITY: Standard Deviation (Minutes)	RELIABILITY: Percent Variation
5:00-6:00 AM	24.5	12.0	9.6	39%
6:00-7:00 AM	35.5	23.0	12.2	34%
7:00-8:00 AM	41.0	28.5	14.0	34%
8:00-9:00 AM	36.2	23.7	14.3	39%

BOOZ·ALLEN IS COLLECTING LOOP DETECTOR DATA FROM SEVERAL CALTRANS DISTRICTS THAT WILL BE USED TO MEASURE HIGHWAY MOBILITY AND RELIABILITY

- In the previous phases of this study, the team evaluated several corridors in a proof-of-concept for the highway modes

- This analysis will be similar to those preliminary tests, but will be performed on a district-wide scale

- The study team has been working closely with Caltrans to receive extensive data from the following districts:

  – District 03 – Sacramento County
  – District 04 – Nine San Francisco Bay Area counties
  – District 07 – Los Angeles/Ventura Counties
  – District 11 – San Diego County
  – District 12 – Orange County

- Data collected differs by district. In some cases, we have several months, while in others just two-three weeks. We will attempt to collect more, but it is unlikely that we will have a complete set from each district

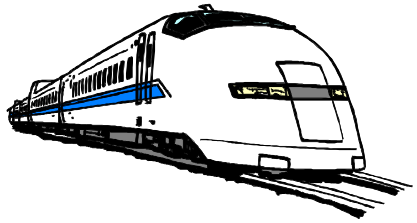
THE LOOP DETECTOR DATA WILL BE PROCESSED TO DEVELOP THE HIGHWAY MOBILITY AND RELIABILITY INDICATORS

- *Mobility* is defined in terms of travel delay. Travel delay is the difference between an optimal travel time (based on the posted speed limit) and the actual travel time

- *Reliability* is the variability of travel time, measured by taking the standard deviation of travel time. The standard deviation is a traditional statistical tool used to measure variability

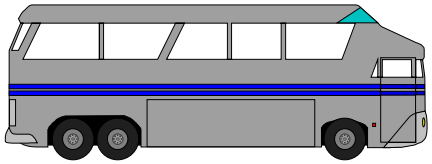
- These measures have been tested extensively in previous phases of this study, but this effort will mark the "roll-out" of district-wide assessments for mobility and reliability

AN EXTENSIVE INVENTORY OF INTER-REGIONAL TRANSIT SERVICES HAS BEEN DEVELOPED



Public Rail

Altamont Commuter Express
Amtrak
Caltrain
Metrolink



Private Bus

Airport Bus of Bakersfield
American Stage Line
Antelope Valley Airport Express
Greyhound
K-T Services
Mt. Lassen
Orange Belt Stages
Santa Barbara Airbus
Santa Cruz Airporter
Santa Rosa Airporter
Ventura County Airporter
VIA (Yosemite Gray Line)

Public Bus

CCAT
Kern Regional Transit
Lake Transit
Mariposa Transit
Mendocino Transit
Modesto MAX
Roseville Transit
SCMTD
San Benito County Transit
San Joaquin Regional Transit
Santa Clara VTA
START
Vallejo Transit
Yolobus

AN EXTENSIVE DATA COLLECTION EFFORT HAS TAKEN PLACE TO DEVELOP THE MOBILITY AND ACCESSIBILITY PERFORMANCE MEASURES FOR BUS AND RAIL INTERCITY TRANSIT

- The inventory of service providers was matched with demand data collected from several sources to develop the performance indicators

- Three principal data sources were used for this analysis:

  – California/Amtrak Intercity Rail Forecasting Model developed for the Caltrans Rail Program and Amtrak
  – 1995 American Travel Survey conducted by the US Department of Transportation Bureau of Transportation Statistics
  – Statewide Planning Model developed by Caltrans Transportation System Information Program (TSIP)

- The Rail Forecasting Model primarily focuses on the San Joaquin, Capitol, and San Diegan rail corridors, while the American Travel Survey contains data on 18 metropolitan regions and excludes travel for distances less than 100 miles

- Caltrans' TSIP provided trip tables from the Statewide Planning Model. This data was pooled with the Rail Program and Bureau of Transportation Statistics data to estimate demand for all county pairs in the state

WE ARE EXAMINING MOBILITY FOR INTER-REGIONAL COUNTY-TO-COUNTY PAIRS WITH DEMAND GREATER THAN 250,000 ANNUAL PERSON TRIPS

- Two hundred and forty two (242) county-to-county pairs have demand for inter-regional travel greater than 500,000 trips annually

- The 250,000 trip threshold was chosen to represent smallest reasonable demand to serve by transit

  – The statewide average mode share of mass transportation is less than 2.5 percent for inter-regional trips. If transit were to attract a 5 percent mode share, the 250,000 trip threshold would be equivalent to one daily bus trip operating almost half-full[1]

  – Mode share is related to the amount of service provided. Some county-to-county pairs may be able to attract a higher mode share if more frequent service were provided

- Inter-regional mobility must be examined at the county level because inter-regional routes and services vary within regions. For example, a person traveling from Marin County to Sacramento may take a different route from a person traveling from Santa Clara County, even though both individuals originate in the San Francisco Bay Area Metropolitan Transportation Commission region

1 *Corresponds to 17 riders per 45 seat bus, or 38% of capacity*

THE STUDY TEAM IS COLLECTING DATA TO CONDUCT A RELIABILITY ANALYSIS FOR INTER-REGIONAL TRANSIT SERVICES

- Reliability will be difficult to measure until on-time performance data is collected from inter-regional operators
- Amtrak/California has on-time performance data available for analysis
- Private bus operators may be reluctant to provide such information, and many public intercity operations do not routinely collect on-time performance data

THERE ARE SEVERAL ISSUES THAT WILL HAVE TO BE ADDRESSED WHEN DEVELOPING THE STATE OF THE SYSTEM

- Extensive data has to be collected in order to measure highway reliability since the reliability indicator requires, at a minimum, several weeks of continuous data to measure variability

- Rural counties typically do not have the personnel or the financial resources to provide the amount of data required for this analysis

- Large, urban districts have differing levels of loop detector coverage. This may affect the overall district-wide mobility and reliability results

- We need to address the issue of inconsistent data spans across districts

- Similarly, a uniform method for "aggregating" results for mobility and reliability needs to be developed for segments/corridors/regions.

Next Steps…

BOOZ·ALLEN WILL CONTINUE TO COLLECT AND ANALYZE DATA FOR THE INTER-REGIONAL STATE OF THE SYSTEM REPORT

- Populate and analyze safety/security data for rail and highway database
- Conduct reliability analysis for transit
- Analyze loop detector data for Caltrans districts on the State Highway System
- Develop methodology for measuring highway reliability in rural counties